

AMENDED CLAIMS for PCT/GB03/00233

(110)

1. An open-ended tube comprising walls of a heat-sealable multi-layer polymeric film, wherein said film comprises an outer shrinkable substrate layer and an inner
5 heat-sealable layer, wherein said substrate layer has a degree of shrinkage in the longitudinal dimension of the tube of about 0% to about 50% over the temperature range 55 to 100°C, and a degree of shrinkage in the transverse dimension of the tube of about 5 to about 70 % over the temperature range 55 to 100°C, wherein said multi-layer film comprises a plurality of separating means which enable one multi-
10 layer portion of said film to be separated from an adjacent multi-layer portion of said film.
2. A tube according to claim 1 wherein the ratio of shrinkage at 100°C in the transverse dimension relative to that in the longitudinal dimension is in the range
15 from 1:1 to 10:1.
3. A tube according to any preceding claim wherein the ratio of shrinkage at 100°C in the transverse dimension to that in the longitudinal dimension is greater than 1:1.
- 20 4. A tube according to any preceding claim wherein the substrate layer has a degree of shrinkage in the longitudinal dimension of the tube of about 0% to about 10% over the temperature range 55 to 100°C, and a degree of shrinkage in the transverse dimension of the tube of about 5% to about 20% over the temperature range 55 to 100°C.
- 25 5. A tube according to any preceding claim wherein the substrate comprises polyester.
6. A tube according to any preceding claim wherein the substrate comprises poly(ethylene terephthalate) or a copolyester in which the major repeat unit is
30 ethylene terephthalate.
7. A tube according to any of claims 1 to 5 wherein the substrate layer comprises a copolyester of terephthalic acid (TPA) and isophthalic acid (IPA) with one or more

diols selected from the group consisting of aliphatic and cycloaliphatic diols wherein the molar ratios of the isophthalate polyester units to the terephthalate polyester units are from 1 to 40 mol % isophthalate and from 99 to 60 mol % terephthalate.

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8. A tube according to claim 7 wherein said diol is ethylene glycol.
9. A tube according to claim 7 or 8 wherein the substrate layer comprises a copolyester comprising substantially 18 mol % ethylene isophthalate and 82 mol %
10 ethylene terephthalate.
10. A tube according to any preceding claim wherein the substrate comprises two or three discrete layers.
- 15 11. A tube according to claim 10 wherein said two layer substrate comprises a first layer A and a second layer B, wherein the polymer of the layer B comprises a copolyester as set out in any of claims 7 to 9, and the polymer of the layer A comprises a copolyester of terephthalic acid with two or more aliphatic glycols, and wherein the layer A is disposed in contact with the heat-sealable layer.
- 20 12. A tube according to claim 10 wherein said three layer substrate comprises an ABA structure, wherein the polymer of the layer B comprises a copolyester as set out in any of claims 7 to 9, and the polymer of the layer A comprises a copolyester of terephthalic acid with two or more aliphatic glycols
- 25 13. A tube according to claim 11 or 12 wherein the aliphatic glycols of the copolyester of the layer(s) A are ethylene glycol and 1,4-cyclohexane dimethanol.
14. A tube according to claim 13 wherein the copolyester of the layer(s) A is a
30 copolyester having about 30-35 mole % 1,4-cyclohexane dimethanol and about 65-70 mole %.

15. A tube according to any preceding claim wherein the heat-sealable layer comprises a copolyester of an aromatic dicarboxylic acid, an aliphatic dicarboxylic acid and a glycol.
- 5 16. A tube according to claim 15 wherein said copolyester of the heat-sealable layer comprises terephthalic acid, sebacic acid and butylene glycol.
17. A tube according to claim 16 wherein said copolyester is a copolyester of butylene glycol with about 50% terephthalic acid and about 50% sebacic acid.
- 10 18. A tube according to any preceding claim wherein said film further comprises a printable or ink-receiving layer disposed on the surface of the substrate opposite to the surface which is in contact with the heat-sealable layer.
- 15 19. A tube according to claim 18 wherein the printable or ink-receiving layer polymer is an acrylic and/or methacrylic polymeric resin.
20. A tube according to claim 18 wherein the printable or ink-receiving layer polymer comprises about 35 to 60 mole % ethyl acrylate, about 30 to 55 mole % methyl methacrylate and about 2 to 20 mole % methacrylamide.
- 20 21. A tube according to any preceding claim wherein said heat-sealable multi-layer film is peelable.
- 25 22. A tube according to any preceding claim wherein each of said separating means comprises one or two sets of perforations extending along a dimension of the tube which is substantially parallel to its longitudinal dimension.
23. A tube according to any preceding claim wherein there are two separating means.
- 30 24. A heat-sealable multi-layer polymeric film comprising a shrinkable substrate layer of polymeric material having on a surface thereof a heat-sealable layer, wherein said shrinkable substrate layer has a degree of shrinkage in a first dimension of

about 0% to about 50% over the temperature range 55 to 100°C, and a degree of shrinkage in a second orthogonal dimension of about 5 to about 70% over the temperature range 55 to 100°C, with the proviso that the heat-sealable multi-layer polymeric film does not comprise a further shrinkable layer laminated to said shrinkable substrate layer, and wherein said multi-layer film comprises a plurality of separating means which enable one multi-layer portion of said film to be separated from an adjacent multi-layer portion of said film.

25. A film according to claim 24 wherein said film is as defined in any of claims 2 to 23.
26. A process for the production of the multi-layer polymeric film of claim 24 or 25 which comprises the steps of:
- (i) forming a polymeric film substrate having a degree of shrinkage in one dimension of about 0% to about 50% over the temperature range 55 to 100°C, and a degree of shrinkage in the other dimension of about 5 to about 70 % over the temperature range 55 to 100°C;
 - (ii) providing a heat-sealable layer on a first surface of said polymeric film substrate wherein said heat-sealable layer is provided by coextrusion of the respective film-forming polymeric materials of the substrate and heat-sealable layers or by coating a surface of the substrate with the polymeric material of the heat-sealable layer;
 - (iii) optionally providing a printable or ink-receiving layer on the surface of the substrate opposite to the surface which is in contact with the heat-sealable layer, and optionally printing onto said printable or ink-receiving layer; and
 - (iv) incorporating a plurality of separating means in the film.
27. A process for the production of an open-ended tube comprising multi-layer polymeric film walls, as defined in any of claims 2 to 23, which comprises steps (i) to (iv) of claim 26 and further comprising:
- (v) forming an open-ended tube by sealing one end portion of the film to the other end portion of the film.

28. A process according to claim 26 or 27 wherein steps (i) and (ii) are effected by a process comprising an in-line or off-line coating technique in the formation of said heat-sealable layer.
- 5 29. A process according to claim 26 or 27 wherein steps (i) and (ii) are effected by a melt-coating process comprising the steps of:
- (a) melt-extruding said substrate layer of polymeric material;
 - (b) stretching said substrate in a first direction;
 - (c) optionally stretching said substrate in a second orthogonal direction;
 - 10 (d) optionally heat-setting the stretched film;
 - (e) forming a heat-sealable coating layer on a surface of the substrate by melt-coating directly thereon a molten polymeric material; and
 - (f) cooling the coated substrate,
- wherein coating step (e) is prior to step (b) or between steps (b) and (c).
- 15 30. A method of sealing a container suitable for use as a receptacle for ready prepared convenience foods, said method comprising the steps of:
- (i) forming a polymeric film substrate having a degree of shrinkage in one dimension of about 0% to about 50% over the temperature range 55 to 100°C, and a degree of shrinkage in the other dimension of about 5 to about 20 70 % over the temperature range 55 to 100°C;
 - (ii) providing a heat-sealable layer on a first surface of said polymeric film substrate wherein said heat-sealable layer is provided by coextrusion of the respective film-forming polymeric materials of the substrate and heat-sealable layers or by coating a surface of the substrate with the polymeric 25 material of the heat-sealable layer;
 - (iii) optionally providing a printable or ink-receiving layer on the surface of the substrate opposite to the surface which is in contact with the heat-sealable layer, and optionally printing onto said printable or ink-receiving layer;
 - 30 (iv) optionally incorporating a plurality of separating means in the film;
 - (v) positioning said multi-layer polymeric film over or around the container, such that said heat-sealable layer of the film is in contact with the container, and such that where said separating means are present the portion of the

film which is contacted with the container is the portion of the film which is between two of said separating means;

- 5 (vi) effecting a seal between the film and the surfaces of the container which define the open end of the container, thereby defining a "lid portion" of the film;
- (vii) forming an open-ended tube by sealing one end portion of the film to the other end portion of the film, such that the container is positioned within the tube; and
- 10 (viii) exposing the container and sealed tube to heat in order to effect shrinkage of the tube, such that the tube fits closely and securely around the container.

31. A method according to claim 30 wherein step (vii) is conducted before steps (v) and (vi).
- 15 32. A process or method according to any of claims 26 to 31 wherein each separating means comprises one or two sets of perforations extending along a dimension of the tube which is substantially parallel to its longitudinal dimension.
33. A process or method according to any of claims 26 to 32 wherein the components
20 of the multi-layer polymeric film are as set out in any of claims 1 to 23.
34. A sealed container comprising a receptacle containing a ready-prepared ovenable meal and an open-ended packaging tube or sleeve within which is disposed the container, and wherein a first portion of said packaging seals said container and
25 wherein a second portion of said packaging is separable from said first portion prior to the cooking cycle of said ovenable meal, wherein said tube or sleeve is formed from a tube as defined in any of claims 1 to 23.
35. A sealed container according to claim 34, wherein the packaging sleeve comprises
30 a lid portion which forms a seal over the open end of the container, and a base portion which surrounds opposing sides and the underside of the container, wherein the base portion and the lid portion are separated by, and separable by virtue of, two separating means, wherein each separating means comprises one or two sets of

perforations extending along a dimension of the sleeve which is substantially parallel to its longitudinal dimension.

36. The use of the film described in claim 24 or 25 in the manufacture of packaging for a container suitable as a receptacle for a ready-prepared ovenable meal, wherein said packaging is in the form of an open-ended tube or sleeve within which is disposed the container, and wherein a first portion of said packaging seals said container, and where a second portion of said packaging is separable from said first portion prior to the cooking cycle of said ovenable meal.

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